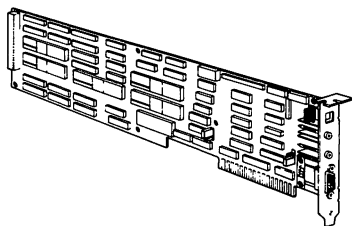
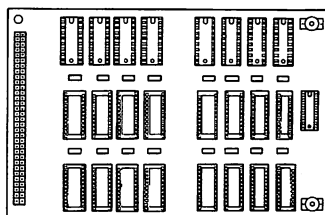


# Installation Instructions for The:

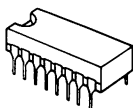
**Enhanced Graphics Adapter, or  
Graphics Memory Expansion Card, or  
Graphics Memory Module Kit**



**Enhanced Graphics Adapter**



**Graphics Memory Expansion Card**



**Graphics Memory Module Kit**

The Enhanced Graphics Adapter option\* consists of:

- Enhanced Graphics Adapter
- Card Support Bracket
- Problem Determination Procedures
- Diagnostic Diskette
- Installation Instructions

The Graphics Memory Expansion Card option\* consists of:

- Graphics Memory Expansion Card
- Installation Instructions

The Graphics Memory Module Kit option\* consists of:

- 16 Graphics Memory Modules
- Installation Instructions

If any of the items are missing or damaged, notify your place of purchase.

\* These options are sold separately.

## **Limited Warranty**

The International Business Machines Corporation warrants this IBM Personal Computer Product to be in good working order for a period of one year from the date of purchase from IBM or an authorized IBM Personal Computer dealer. Should this Product fail to be in good working order at any time during this one year warranty period, IBM will, at its option, repair or replace this Product at no additional charge except as set forth below. Repair parts and replacement Products will be furnished on an exchange basis and will be either reconditioned or new. All replaced parts and Products become the property of IBM. This limited warranty does not include service to repair damage to the Product resulting from accident, disaster, misuse, abuse, or non-IBM modification of the Product.

Limited Warranty service may be obtained by delivering the Product during the one year warranty period to an authorized IBM Personal Computer dealer or IBM Service Center and providing proof of purchase date. If this Product is delivered by mail, you agree to insure the Product or assume the risk of loss or damage in transit, to prepay shipping charges to the warranty service location and to use the original shipping container or equivalent. Contact an authorized IBM Personal Computer dealer or write to IBM Personal Computer, Sales and Service, P.O. Box 1328-W, Boca Raton, Florida 33432, for further information.

ALL EXPRESS OR IMPLIED WARRANTIES FOR THIS PRODUCT INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO A PERIOD OF 1 YEAR FROM THE DATE OF PURCHASE, AND NO WARRANTIES, WHETHER EXPRESS OR IMPLIED, WILL APPLY AFTER THIS PERIOD. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU.

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SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR CONSUMER PRODUCTS, SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY TO YOU.

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# **FEDERAL COMMUNICATIONS COMMISSION RADIO FREQUENCY INTERFERENCE STATEMENT**

**Warning:** This equipment has been certified to comply with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of FCC rules. Only peripherals (computer input/output devices, terminals, printers, etc.) certified to comply with the Class B limits may be attached to this computer. Operation with non-certified peripherals is likely to result in interference to radio and TV reception.

## **INSTRUCTIONS TO USER**

This equipment generates and uses radio frequency energy and if not installed and used properly, i.e., in strict accordance with the operating instructions, reference manuals, and the service manual, may cause interference to radio or television reception. It has been tested and found to comply with the limits for a Class B computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a residential installation.

If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Relocate the equipment with respect to the receiver.
- Move the equipment away from the receiver.
- Plug the equipment into a different outlet so that equipment and receiver are on different branch circuits.
- Ensure that card mounting screws, attachment connector screws, and ground wires are tightly secured.
- Ensure that card slot covers are in place when no card is installed.
- If peripherals not offered by IBM are used with this equipment, it is suggested that you use shielded, grounded cables with in-line filters, if necessary.

If necessary consult your dealer service representative for additional suggestions.

The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. It is the responsibility of the user to correct such interference.

**Notes:**

# Contents

Installation Requirements .....	1
Tools Required .....	2
Installation Instructions .....	3
Direct Drive Connector Information .....	33
Light Pen Connector Information .....	34

**Notes:**



# Installation Requirements

- The Enhanced Graphics Adapter must be installed in the system unit.
- IBM Personal Computers manufactured before April 1983 must have a new ROM module installed on the system board before you install the IBM Enhanced Graphics Adapter.

If you are not sure which ROM module is installed on your system board, run the following BASIC program.

This program displays the date of the ROM module installed on your system board. Type the program exactly as shown. If the date displayed is earlier than 10/27/82, a new ROM module is required. Contact your place of purchase.

```
10 DEF SEG=&HF000
20 FOR X=&HFFF5 TO &HFFFF
30 PRINT CHR$(PEEK(X));
40 NEXT
RUN
```

Refer to the *IBM BASIC* manual for additional information on BASIC programs.

# Tools Required

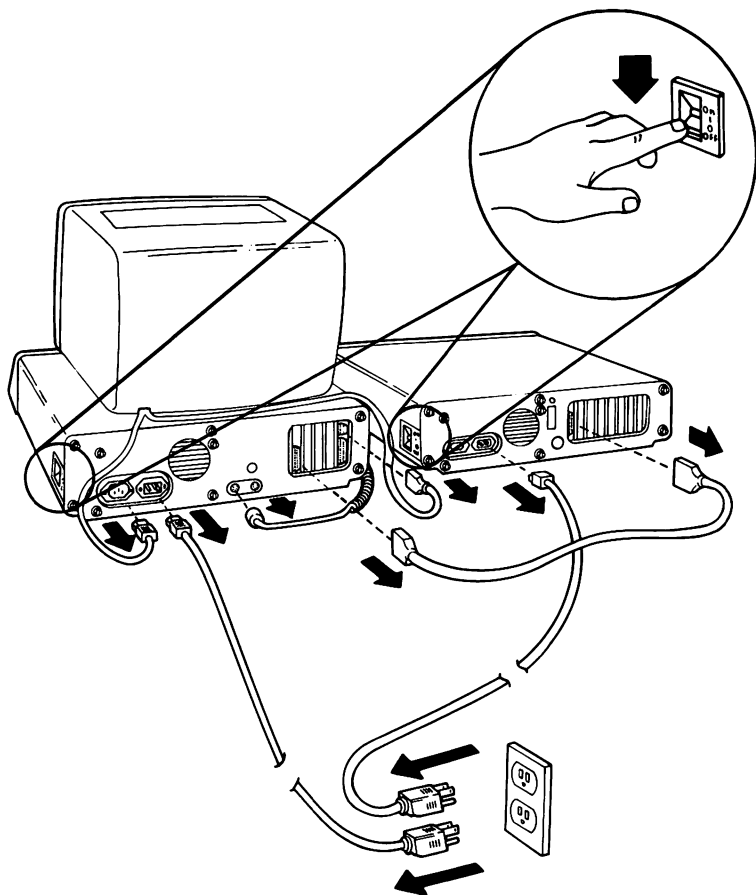
- Medium-size, flat-blade screwdriver

## Optional:

- Medium screwstarter
- 3/16-inch nutdriver
- 1/4-inch nutdriver
- Module puller (if installing Graphics Memory Module Kit)
- Small screwdriver

# Installation Instructions

- 1** Set the Power switch on the system unit (and expansion unit, if attached) to Off.
- 2** Set the Power switches on all external devices (printer, TV, etc.) to Off.
- 3** Unplug the system unit's (and expansion unit's) power cord from the wall outlet.
- 4** Disconnect all cables from the rear of the system unit.

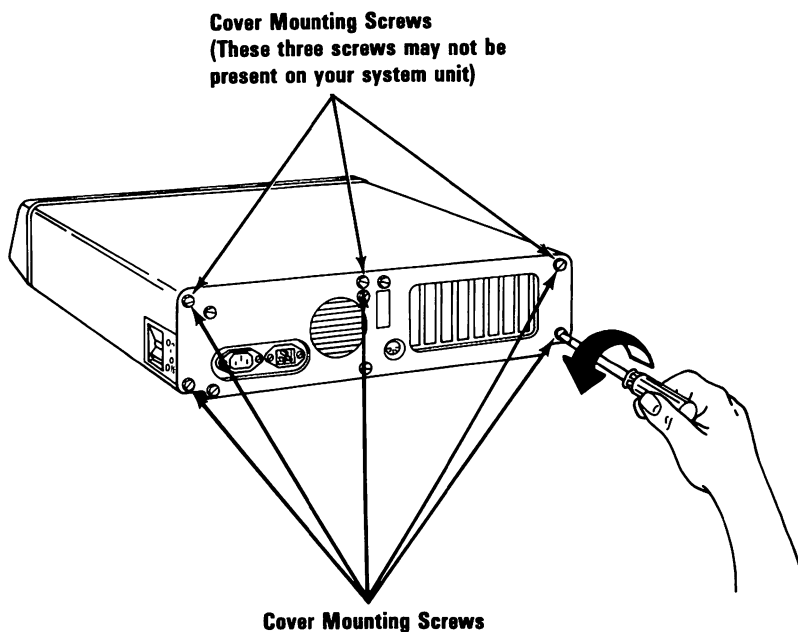


**August 2, 1984**

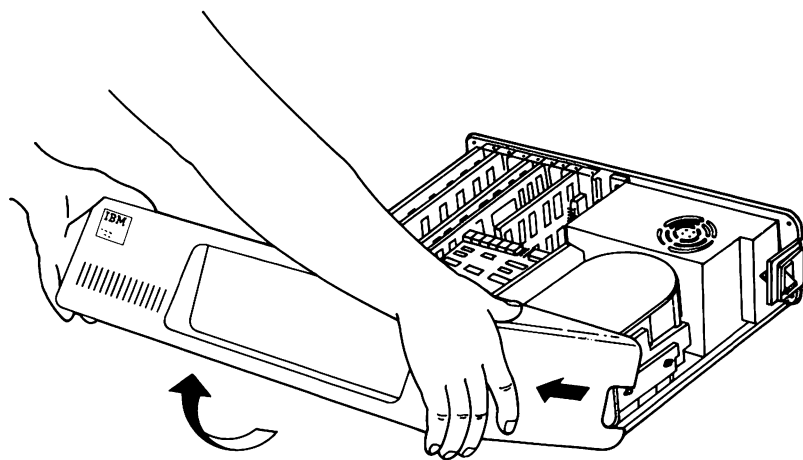
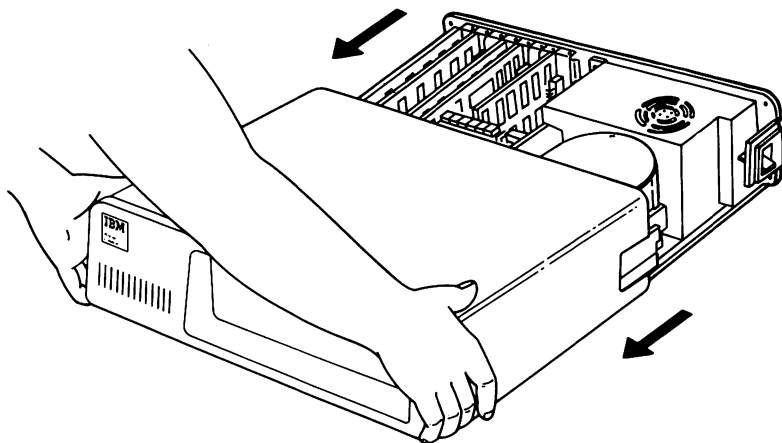
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**Enhanced Graphics Adapter 3**

- 5 Move your keyboard and all attached devices away from the work area.
- 6 Position the system unit to allow access to the rear.
- 7 Use the flat-blade screwdriver or 1/4-inch nutdriver and remove the cover mounting screws by turning them counterclockwise as shown in the figure below. Save the screws for reinstallation of the cover.



- 8** Carefully slide the system unit's cover away from the rear and to the front, as shown in the figure below. When the cover will go no further, tilt it up, remove it from the base, and set it aside.

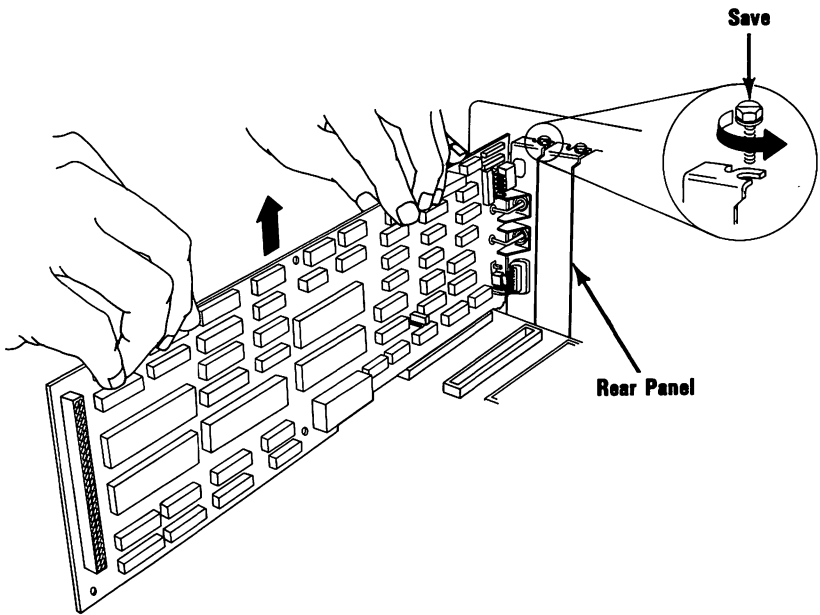


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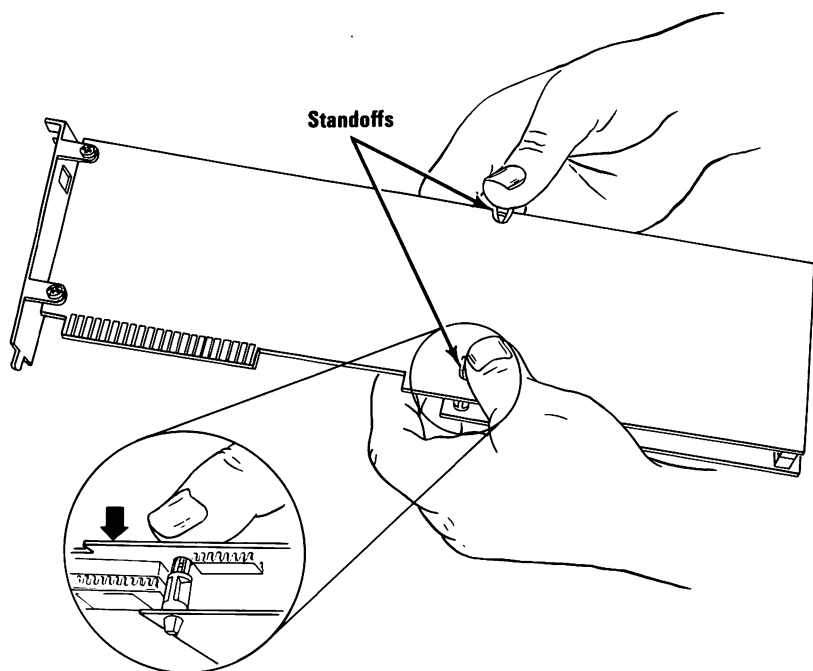
**Enhanced Graphics Adapter 5**

- 9** If you are installing the Enhanced Graphics Adapter in your system for the first time, go to Step 14. If the graphics adapter is already installed in your system, and you are installing the Graphics Memory Expansion Card or the Graphics Memory Module Kit, go to Step 10.
- 10** Use the flat-blade screwdriver or 3/16-inch nutdriver and remove the screw that holds the Enhanced Graphics Adapter in place by turning the screw counterclockwise. Save the screw for the reinstallation of the adapter.
- 11** Grasp the adapter by the top and lift it straight up.

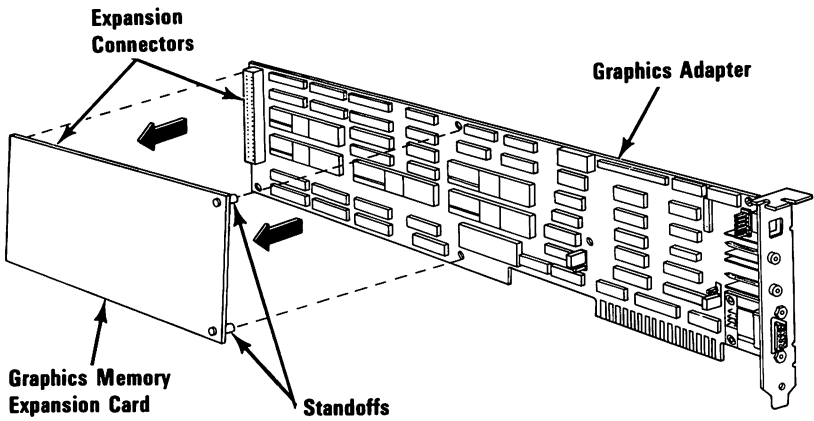


- 12** If the expansion card is installed on the graphics adapter, it must be removed at this time. If it is not installed, go to Step 14.

To remove the expansion card, press on the ends of the standoffs (on the pin side of the adapter) to release them from the adapter.

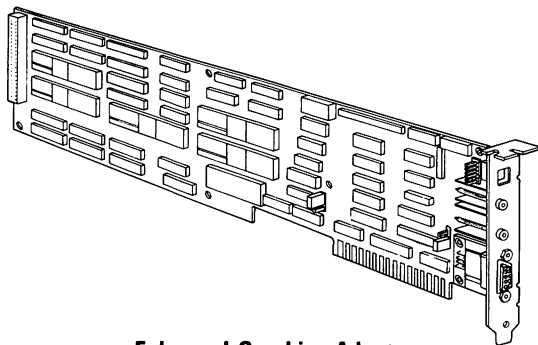


- 13** Carefully separate the expansion connector and pull the expansion card away from the graphics adapter.

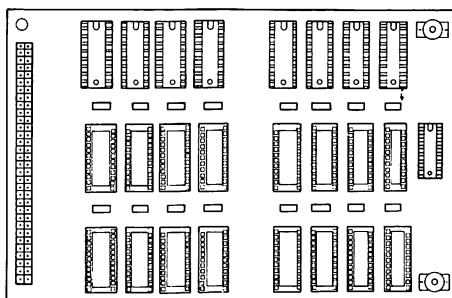




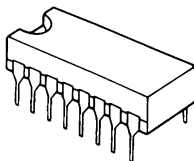
- 14** These installation instructions are for the Enhanced Graphics Adapter, the Graphics Memory Expansion Card and the Graphics Memory Module Kit. The adapter can be installed alone or with the expansion card and memory kit attached to it to provide additional graphics memory.



**Enhanced Graphics Adapter**



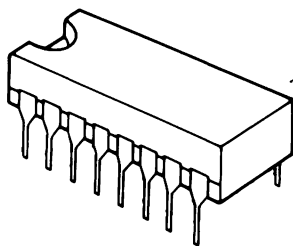
**Graphics Memory Expansion Card**



**Graphics Memory Module Kit**

**15** Carefully read the following steps and answer each question as it relates to your installation.

**16** The Graphics Memory Module Kit consists of 16 memory modules that plug into the expansion card. This adds an additional 128K of graphics memory to the expansion card.

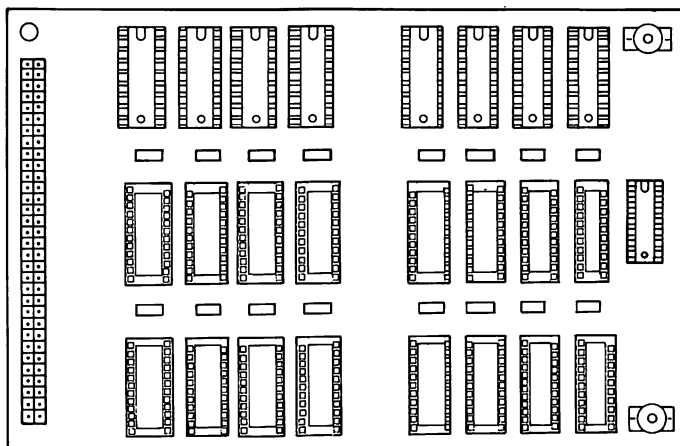


**DO YOU HAVE A GRAPHICS MEMORY MODULE KIT TO INSTALL?**

**YES** Go to Step 19, Graphics Memory Module Kit Installation.

**NO** Go to next step.

- 17** The Graphics Memory Expansion Card plugs into the graphics adapter to expand the memory of the adapter to 128K (256K if the memory kit has been installed on the expansion card).

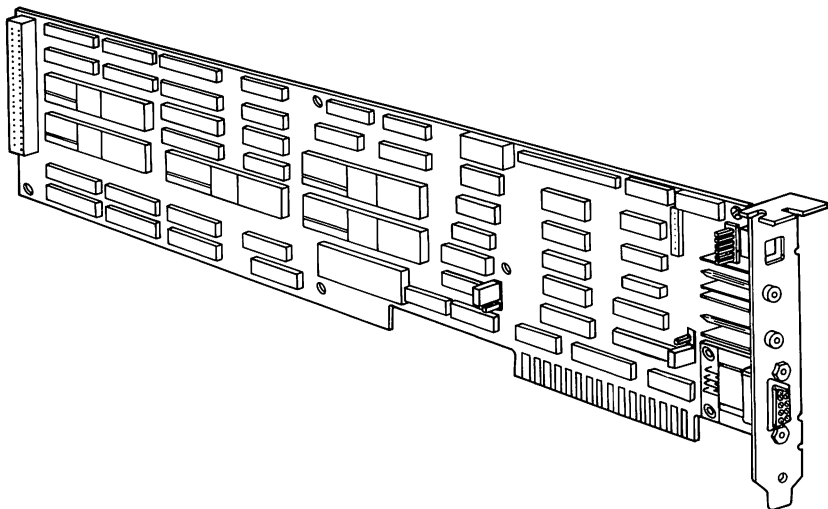


**DO YOU HAVE AN GRAPHICS MEMORY  
EXPANSION CARD TO INSTALL?**

**YES** Go to Step 22, Graphics Memory Expansion Card Installation.

**NO** Go to next step.

- 18** The Enhanced Graphics Adapter can be installed without any options attached to it. The adapter has a total of 64K of graphics memory. Options can be added at any time to expand the graphics memory to 128K or 256K.

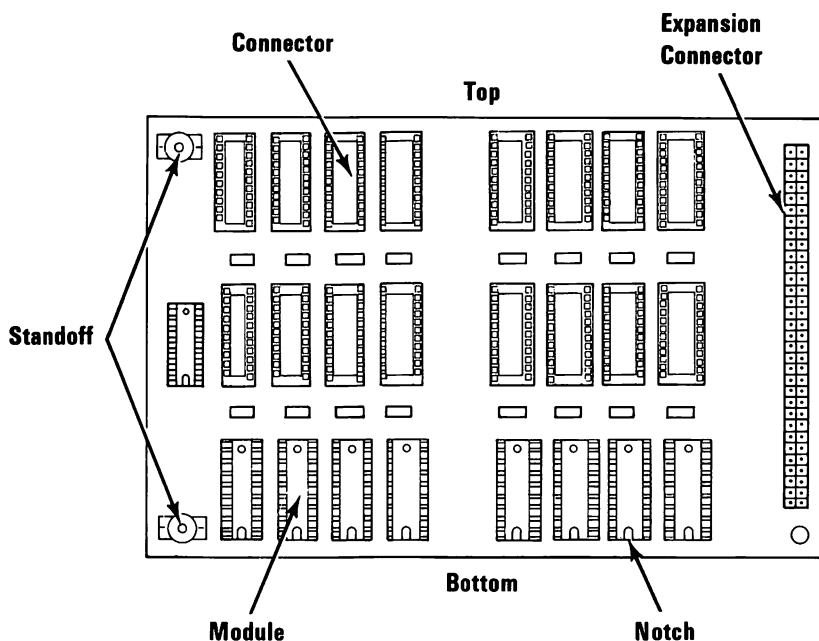


**YOU ARE INSTALLING THE ENHANCED GRAPHICS ADAPTER WITH NO OPTIONS ATTACHED.**

Go to Step 24, Enhanced Graphics Adapter Installation.

## Graphics Memory Module Kit Installation

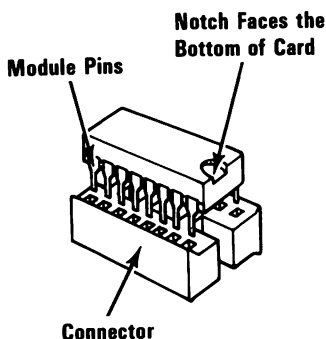
- 19** Take the expansion card and place it on a flat surface with the components facing up, as shown below. Study the figure below to become familiar with the module layout.



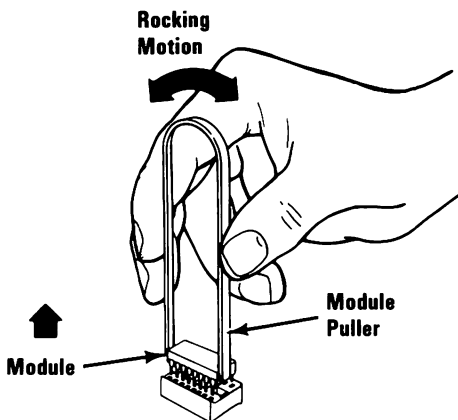
**Warning:** Damage to the module or expansion card may result if the modules are installed incorrectly. The module must be installed with the notch facing the bottom of the card.

- 20** You are now ready to install your modules. The modules are identical, and each module has a notch that faces the bottom of the card when installed.

**Warning:** The pins on the module are easily bent and must be aligned with the connector before the module is pressed in place.

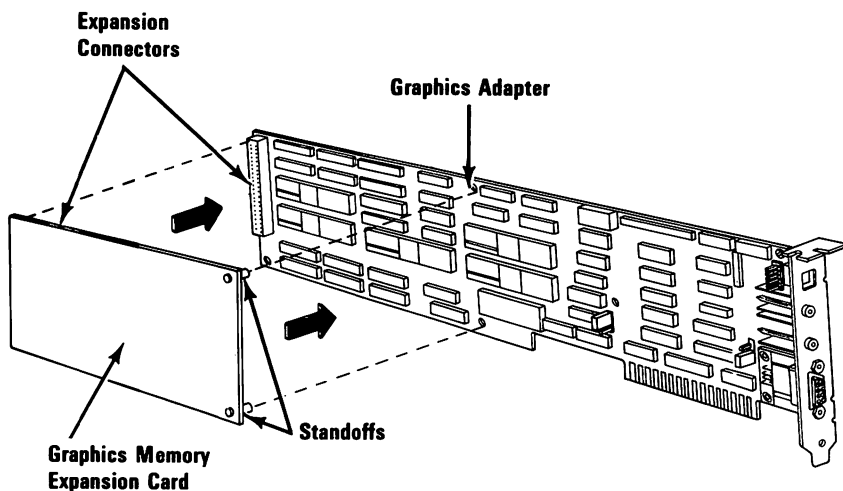


- 21** Align the pins of each module with the connector and firmly press each of the 16 modules in place. If you install a module incorrectly, carefully remove it with a module puller (or small screwdriver) as shown below. After installing all of the modules, go to Step 22.

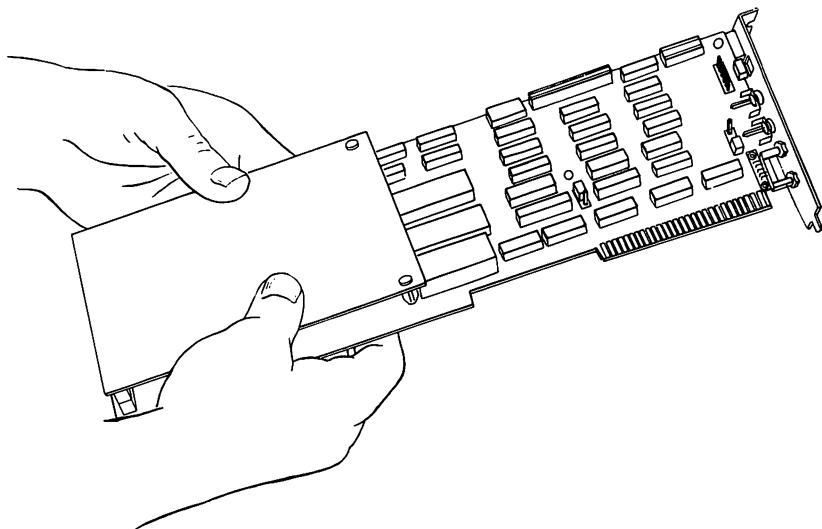


## Graphics Memory Expansion Card Installation

- 22** Align the expansion card with the graphics adapter. Pay close attention to the location of the standoffs and the expansion connector.



- 23** Carefully press the expansion card and graphics adapter together. Go to Step 24.



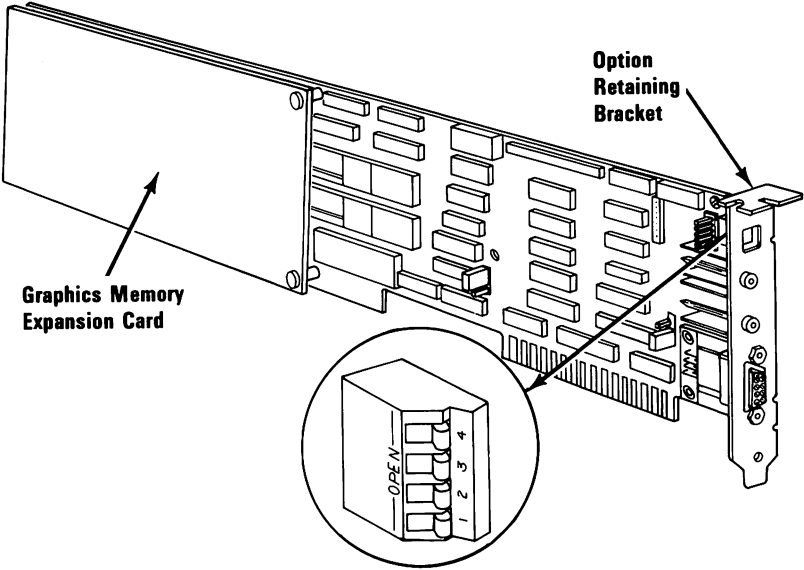
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**Enhanced Graphics Adapter 15**

# Enhanced Graphics Adapter Installation

- 24** Look at the rear of the graphics adapter and find the switch block thru the access hole in the retaining bracket.





- 25** To set the switches on your graphics adapter, use the Switch Setting Tables Guide on the following page.

You set the adapter switches to indicate:

- The type of display connected to your Enhanced Graphics Adapter (color or monochrome).
- The number of display screen columns (40x25 or 80x25), being used by your display.

**Note:** A screen display of 40x25 is 40 characters wide by 25 rows of characters high. A screen display of 80x25 is 80 characters wide by 25 rows of characters high (80x25 is usually used for the IBM Color Display.)

- That you are using more than one display adapter, and the type of displays attached.

The following chart shows the adapters and the displays that may be attached to each adapter.

ADAPTERS	DISPLAYS		
Enhanced Graphics	Monochrome	Color	Enhanced Color
Color/ Graphics		Color	Enhanced Color
Monochrome	Monochrome		

When you are done setting the switches on the Enhanced Graphics Adapter, go to Step 26.

## Switch Setting Tables Guide

**Note:** The system configurations shown in the left column are the only acceptable combinations that can be installed.

**Note:** Whenever you are using two displays, one of them must be a Monochrome Display.

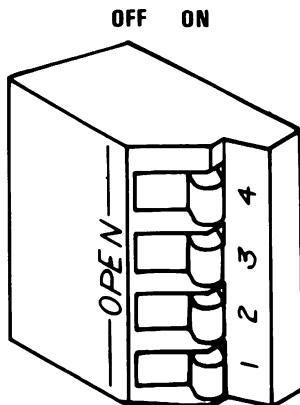
<b>System Configuration</b>	<b>Use:</b>
The Enhanced Graphics Adapter will be the only display adapter you have installed in your system.	Table 1
The Enhanced Graphics Adapter and the IBM Monochrome Display and Printer Adapter will both be installed in your system, and the Enhanced Graphics Adapter will be the Primary Display Adapter.	Table 2
The Enhanced Graphics Adapter and the IBM Monochrome Display and Printer Adapter will both be installed in your system, and the Monochrome Display and Printer Adapter will be the Primary Display Adapter.	Table 3
The Enhanced Graphics Adapter and the IBM Color/Graphics Adapter will both be installed in your system, and the Enhanced Graphics Adapter will be the Primary Display Adapter.	Table 4
The Enhanced Graphics Adapter and the IBM Color/Graphics Adapter will both be installed in your system, and the Color/Graphics Adapter will be the Primary Display Adapter.	Table 5

**TABLE 1**

Use these Switch Settings if the **Enhanced Graphics Adapter** is the **ONLY** display adapter you have installed in your system.

SW1	SW2	SW3	SW4	Type of Display Attached and Initial Mode Selection*
Off	Off	On	Off	Monochrome
On	Off	Off	On	Color (40x25)
Off	Off	Off	On	Color (80x25)
On	On	On	Off	Enhanced Color (in Normal Color Mode)
Off	On	On	Off	Enhanced Color (in Enhanced Color Mode)

**\*Note:** Mode Selection can be changed by programming

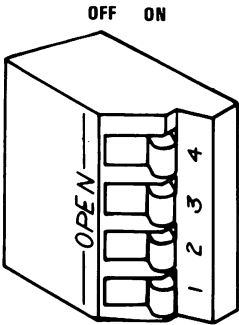


**TABLE 2**

Use these Switch Settings if the Enhanced Graphics Adapter and the IBM Monochrome Display And Printer Adapter are **BOTH** installed in your system, and the **Enhanced Graphics Adapter** is the **Primary Display Adapter**.

**Note:** A color display is the only display that may be attached to the Enhanced Graphics Adapter.

Switch Settings				Type of Display Attached and Initial Mode Selection	
SW1	SW2	SW3	SW4	Enhanced Graphics Adapter	Monochrome And Printer Adapter
On	Off	Off	On	Color (40x25)	Monochrome or None
Off	Off	Off	On	Color (80x25)	Monochrome or None
On	On	On	Off	Enhanced Color (in Normal Color Mode)	Monochrome or None
Off	On	On	Off	Enhanced Color (in Enhanced Color Mode)	Monochrome or None

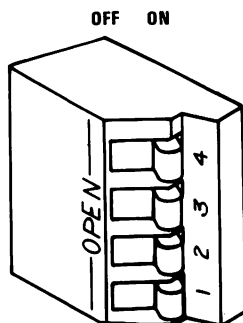


**TABLE 3**

Use these Switch Settings if the Enhanced Graphics Adapter and the IBM Monochrome Display And Printer Adapter are **BOTH** installed in your system, and the **Monochrome Display And Printer Adapter** is the **Primary Display Adapter**.

**Note:** A color display is the only display that may be attached to the Enhanced Graphics Adapter.

Switch Settings				Type of Display Attached and Initial Mode Selection	
SW1	SW2	SW3	SW4	Enhanced Graphics Adapter	Monochrome And Printer Adapter
Off	On	On	On	None	Monochrome
On	On	On	On	Color (40x25)	Monochrome
Off	On	On	On	Color (80x25)	Monochrome
On	Off	On	On	Enhanced Color (in Normal Color Mode)	Monochrome
Off	Off	On	On	Enhanced Color (in Enhanced Color Mode)	Monochrome



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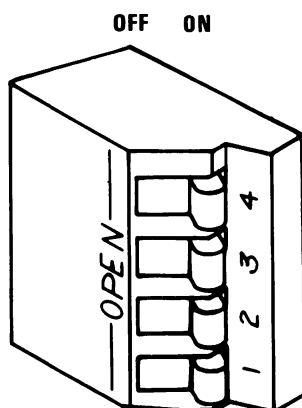
**Enhanced Graphics Adapter 21**

**TABLE 4**

Use these Switch Settings if the Enhanced Graphics Adapter and the IBM Color Graphics/Adapter are **BOTH** installed in your system, and the **Enhanced Graphics Adapter** is the **Primary Display Adapter**.

**Note:** A monochrome display is the only display that may be attached to the Enhanced Graphics Adapter.

Switch Settings				Type of Display Attached to:	
SW1	SW2	SW3	SW4	Enhanced Graphics Adapter	Color/Graphics Adapter
Off	Off	On	Off	Monochrome	None
On	Off	On	Off	Monochrome	Color (40x25)
Off	Off	On	Off	Monochrome	Color (80x25)

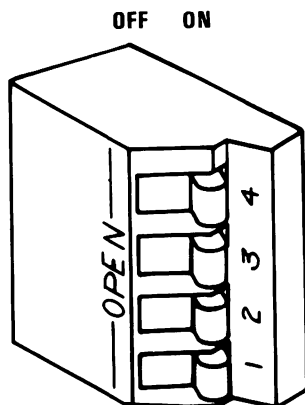


**TABLE 5**

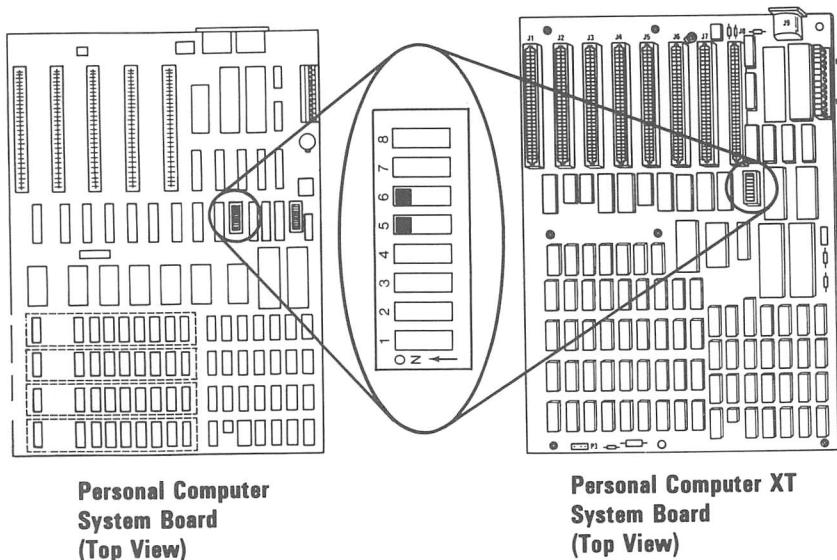
Use these Switch Settings if the Enhanced Graphics Adapter and the IBM Color/Graphics Adapter are **BOTH** installed in your system, and the **Color/Graphics Adapter** is the **Primary Display Adapter**.

**Note:** A monochrome display is the only display that may be attached to the Enhanced Graphics Adapter.

Switch Settings				Type of Display Attached to:	
SW1	SW2	SW3	SW4	Enhanced Graphics Adapter	Color/Graphics Adapter
On	On	Off	On	Monochrome or None	Color (40x25)
Off	On	Off	On	Monochrome or None	Color (80x25)



The following figure shows the proper system board DIP switch settings for the IBM Enhanced Graphics Adapter. Locate Switch Block No. 1 on your system board and set switches 5 and 6 to On at this time. Do not change any other Switches.

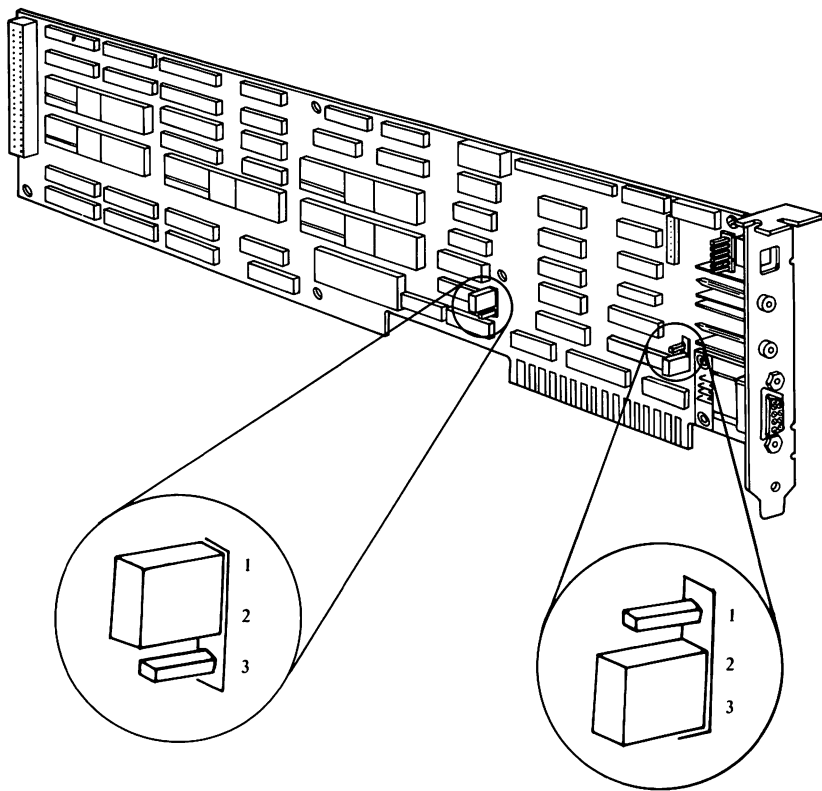


**Note:** The DIP switches must be set as shown whenever the Enhanced Graphics Adapter is installed, regardless of display type. This holds true even when a second display adapter is installed in the system.



- 27** Study the figures below and find the two 3-pin connectors on the adapter. Ensure that the jumpers on connectors **P1** and **P3** are positioned as indicated in the chart below. If the jumpers need to be changed, they pull off the pins.

**Warning:** Damage to the graphics adapter, the display, or both may result if these jumpers are not in the correct position.

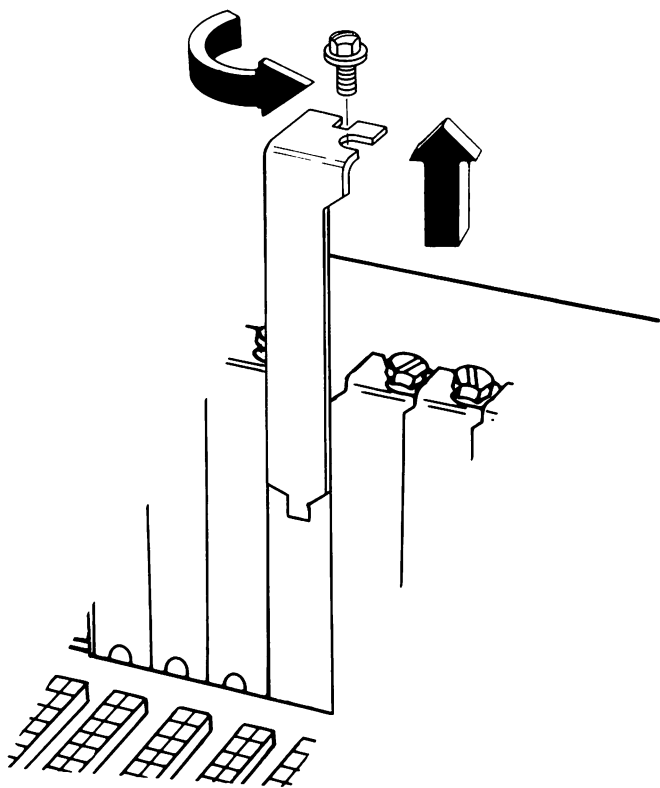


Display attached to the Enhanced Graphics Adapter.	P1	P3
IBM Color Display or IBM Monochrome Display	2 & 3	1 & 2
IBM Enhanced Color Display	1 & 2	1 & 2

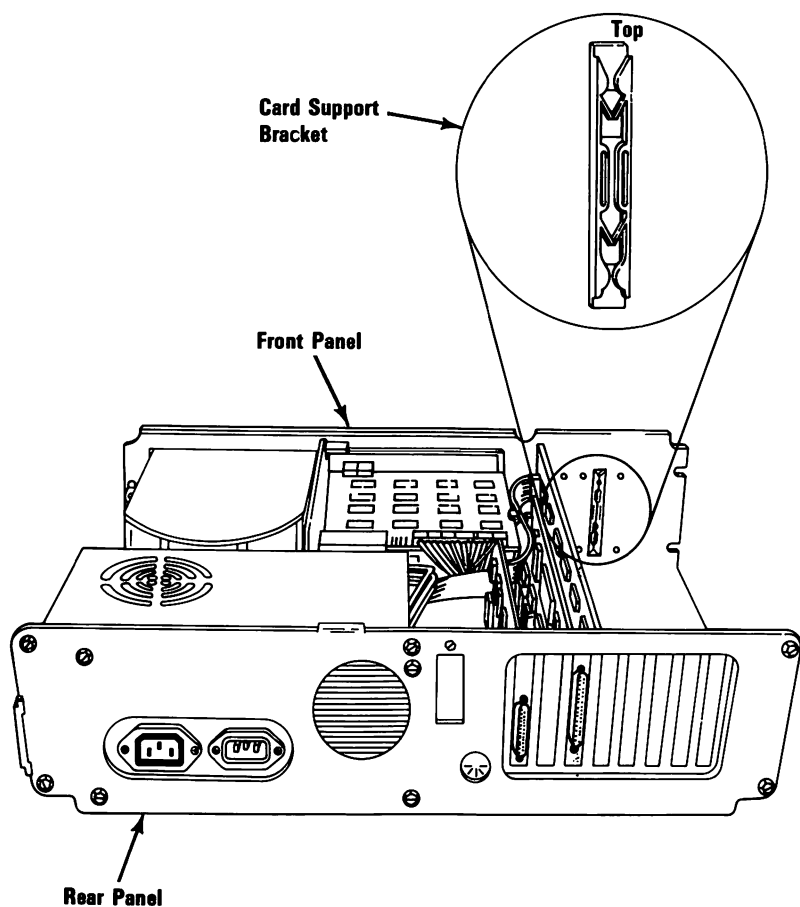
- 28** Look at the inside left rear of the system unit, and locate the expansion slots. Select an unused expansion slot in which to install your option. (The far left slot is recommended.)

**Note:** If you removed the graphics adapter in a previous Step, use the expansion slot the adapter was installed in and go to Step 32 on Page 28.

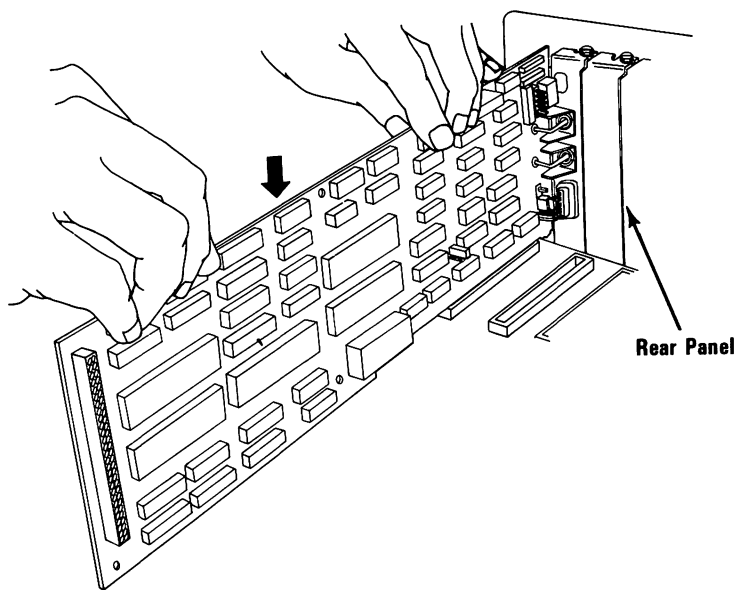
- 29** Use a flat-blade screwdriver or 3/16-inch nutdriver and remove the screw that holds the expansion slot cover in place by turning the screw counterclockwise. Save the screw for the installation of the option. Remove the expansion slot cover and discard it.



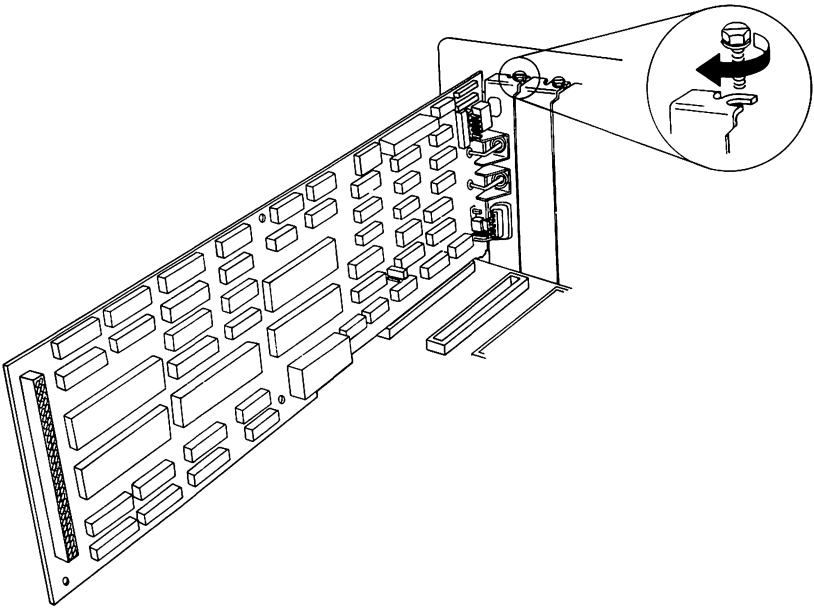
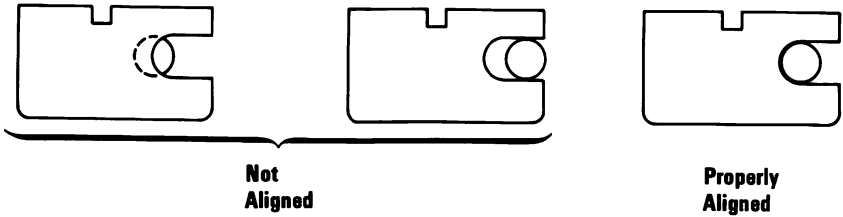
- 30** Press the card support bracket into the corresponding holes in the front panel of the system unit. (The card support bracket is in your option package.)



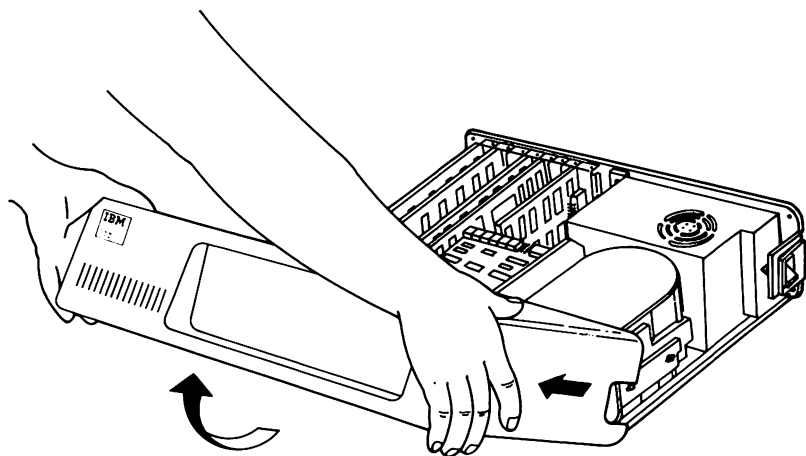
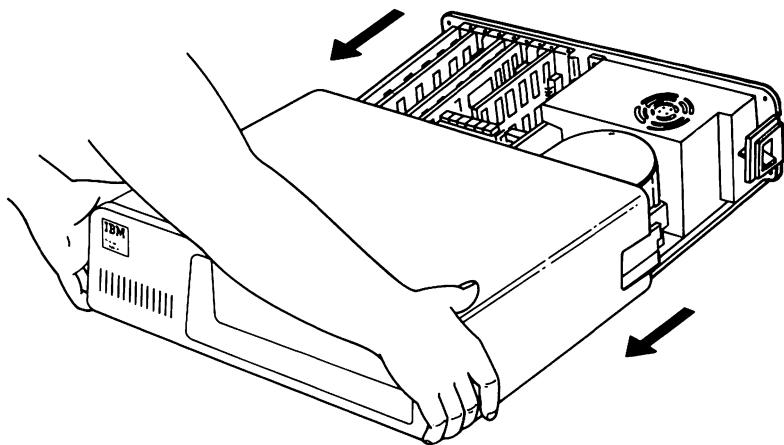
- 31** Hold the adapter by the top and firmly press it into the expansion slot as shown below.



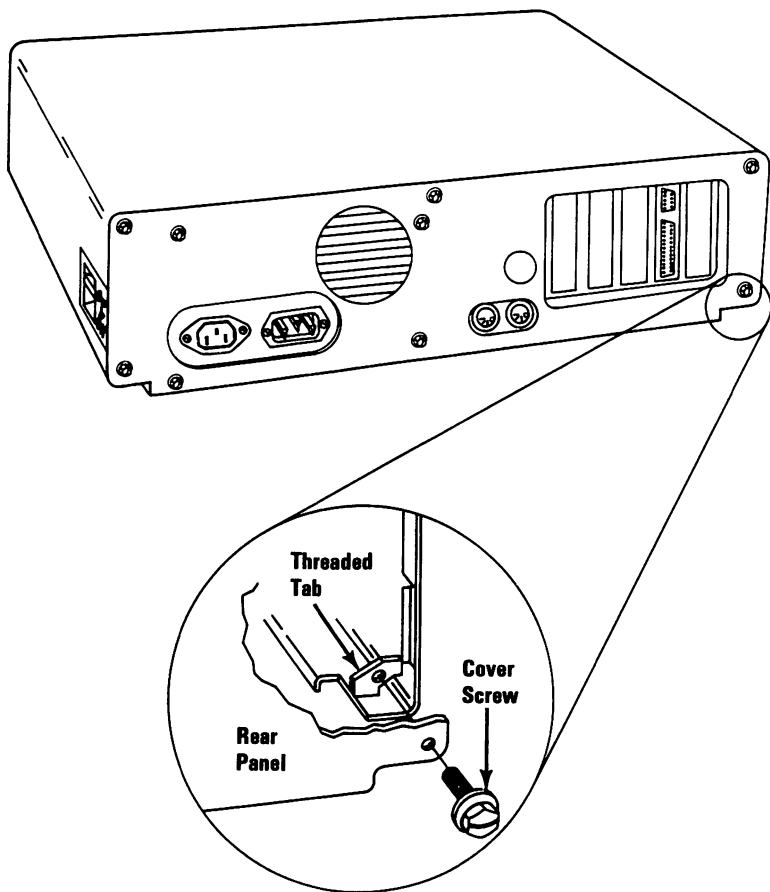
- 32** Align the slot in the adapter retaining bracket with the hole in the rear plate of the system unit. Start the screw clockwise, then tighten with a flat-blade screwdriver or a 3/16-inch nutdriver.



- 33** If you have any other options to install, do so now before putting the system unit's cover back on. Put the system unit's cover on by positioning it as shown and carefully sliding it toward the rear of the unit.



- 34** When the cover is all the way to the rear, align the screws with the threaded tabs and tighten. Use a flat-blade screwdriver or a 1/4-inch nutdriver and turn clockwise.



**35** Your system is now ready to be recabled. Refer to the section titled "Setup" or "Introduction/Installation" in your *Guide to Operations* manual.

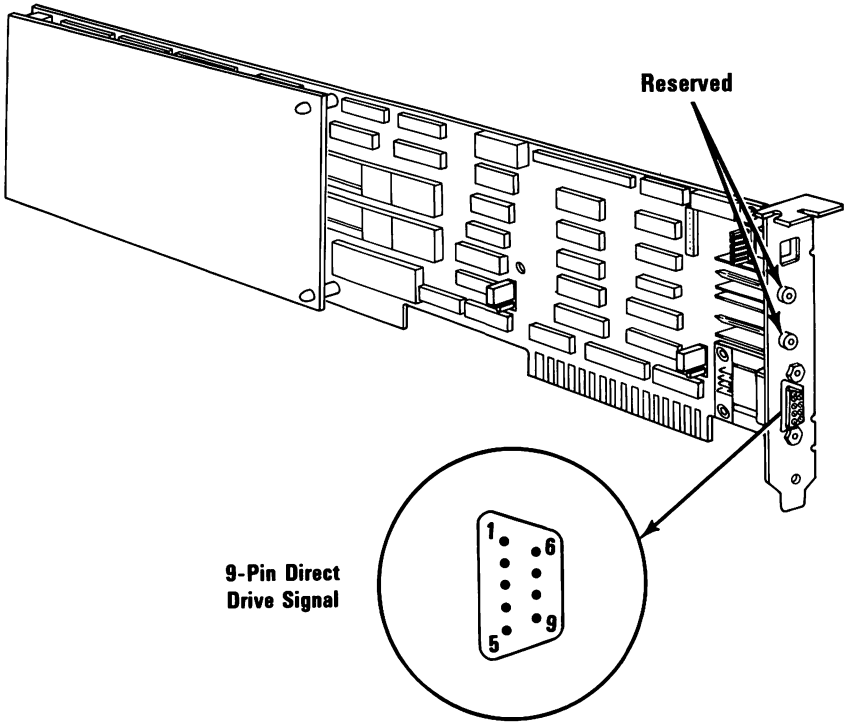
Insert these instructions in your *Guide to Operations* manual in the section titled "Options" or "Option Installation."

**Note:** If you have any problems after installation, one of the following is the most likely cause:

- Cabling is incorrect.
- Switches or jumpers are set incorrectly.
- Other options may have been loosened.
- Memory module (incorrectly installed).
- Graphics Memory Expansion Card.
- Enhanced Graphics Adapter.



# Direct Drive Connector Information



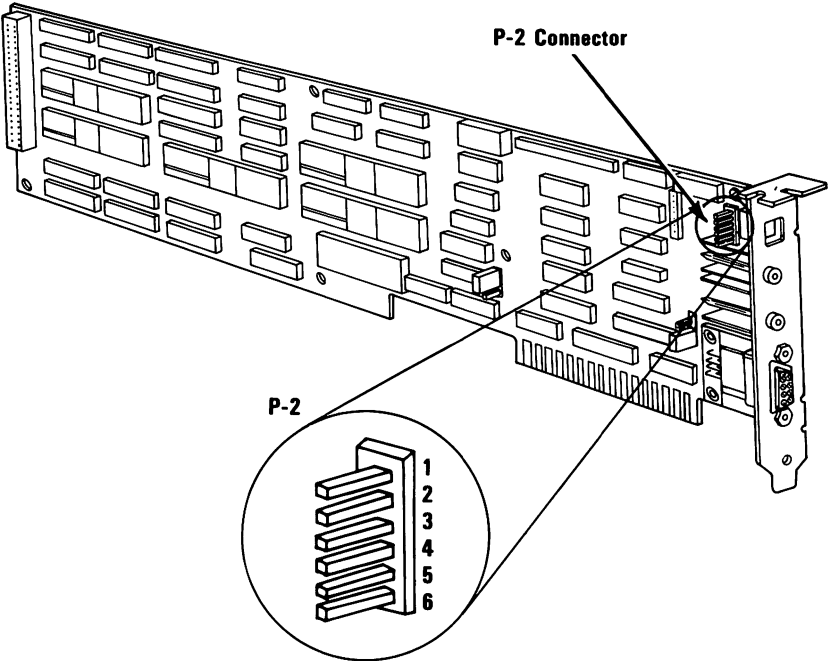
	Signal Name - Description	Pin	
<b>Direct Drive Display</b>	Ground	1	<b>Enhanced Graphics Adapter</b>
	Secondary Red	2	
	Primary Red	3	
	Primary Green	4	
	Primary Blue	5	
	Secondary Green/Intensity	6	
	Secondary Blue/Mono Video	7	
	Horizontal Retrace	8	
	Vertical Retrace	9	

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Enhanced Graphics Adapter 33

# Light Pen Connector Information



	P-2 Connector	Pin	
Light Pen Attachment	+Light Pen Input	1	Enhanced Graphics Adapter
	Not used	2	
	+Light Pen Switch	3	
	Ground	4	
	+5 Volts	5	
	12 Volts	6	

**Notes:**

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**Enhanced Graphics Adapter 35**

**Notes:**